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I also certify that by virtue of an assignment registered under the Patents Act 1977, the application is now proceeding in the name as substituted.

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Signed

Dated 26 March 2003

GB0222544.9

By virtue of a direction given under Section 30 of the Patents Act 1977, the application is proceeding in the name of:-

BACCHUS TECHNOLOGIES LTD
Incorporated in the United Kingdom
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ADP No. 08572836002

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PATENTS ACT 1977

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30 SEP 2002

REQUEST FOR GRANT OF A PATENT

0222544.9

THE GRANT OF A PATENT IS REQUESTED BY THE UNDERSIGNED ON THE BASIS OF THE PRESENT APPLICATION

I Agent's reference: TAYLOR III

II Title of Invention: Corks and Closures

SECTION 30 (1977 ACT) APPLICATION FILED 17.02.03

III Applicant:
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VII Declaration of Priority:
Nil

VIII The Application claims an earlier date under Section 8(3), 12(6), 15(4), or 37(4):
Nil

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IX Check List

A	The application contains the following numbers of sheets:		B	The application as filed is accompanied by:
1	Request	1 sheet		nil
2	Description	~~8~~ 5 sheets		
3	Claims	nil		
4	Drawings	nil		
5	Abstract	nil		

X It is suggested that Figure No of the drawings should accompany the abstract when published

XI Signature:

Applicant

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Corks and Closures

The present invention relates to corks and similar closures.

Corks have traditionally been used to close wine bottles (both still and sparkling), spirit bottles, and the like. The traditional material is natural cork, which is obtained from the bark of certain oak trees. The cork is inserted into the neck of the bottle and expands due to its inherent elasticity to seal the neck of the bottle, preventing air from ingressing and wine from escaping.

More recently, various modern variants have been introduced. In some cases, these use synthetic plastics materials; in others, they use natural cork which has been reconstituted in some way, alone or in combination with synthetic materials. Examples of synthetic closures are described, for example, in WO 96/34806. These are typically cylinders of elastomers such as polypropylene, polyethylene and vinyl acetate. The elastomers are melted and mixed with blowing agents which create a foam. The mixture is then typically either injected into a mould or extruded and sliced to produce synthetic closures of shapes and sizes which are similar to natural corks.

Synthetic closures can also be made of foamed resins such as polystyrene or mixtures of polystyrene and other chemicals such as butadiene rubber. These are manufactured by injecting beads of expandable polystyrene into moulds. The beads themselves contain a blowing agent, typically pentane. Steam is injected into the mould and the beads swell up and stick together, taking the cylindrical shape of the mould.

A comparative trial of synthetic closures versus natural corks, run by the Australian Wine Research Institute and whose results were published in the

Australian Journal of Grape and Wine Research in 2001, showed that in general, synthetic closures do not fully reproduce the sealing capabilities of natural cork. In particular, wine bottled using synthetic closures tends to oxidize faster than wine bottled using quality natural corks. This is partly due to the penetration of oxygen through the interface between the synthetic material and the glass bottle, but also, we have surprisingly found, through the body of the synthetic material. Whilst the rate of oxygen permeation is small, over time the amount of oxygen getting through can be significant.

Our research has found that the polymer chains which make up the elastomers and resins are large molecules which surprisingly provide space for small oxygen molecule to diffuse through. The core of a synthetic closure is foamed to provide much of the elasticity of the closure, so the amount of polymer through which a molecule of oxygen has to pass is small relative to the length of the closure.

There have been concerns about the possible permeability of both natural corks and synthetic closures. With natural corks, a wax plug has been used as an additional barrier on the top end of the cork; this is in fact provided primarily for aesthetic effect. With synthetic closures, WO 96/34806 (Betacorque) has proposed the use of a flexible impervious coating such as polyurethane on the ends of the closure if an additional degree of impermeability is required.

The main object of the present invention is to provide an improved closure member which provides control of gas penetration, particularly oxygen penetration, preferably to a low level.

We have found that the barrier layer of the Betacorque type suffers from various disadvantages, some of which stem to a significant extent from the location of the barrier layer.

Positioning the barrier layer on the end (or ends) of the closure member has the danger that the barrier layer may become damaged during the manufacture and handling of the closure member and its insertion into the bottle. Further, there may be manufacturing problems in achieving a barrier which extends to the very edge of the closure member, particularly if the closure member has a slight bevel at its ends. As a result, it may not make good contact with the sides of the neck of the bottle, so allowing diffusion of oxygen around the edges of the barrier, to an extent which may vary widely from one closure member to another.

If the barrier is on the lower end of the closure member, the cork may extend down the neck of the bottle to a point where the neck begins to open out, again resulting in poor or non-existent contact with the edges of the neck, and so again resulting in diffusion around the edges of the barrier. If it is on the upper end of the closure member, it is potentially liable to mechanical damage during subsequent handling of the bottle.

Further, the barrier may have a different appearance from the main body of the closure member, and for some barrier materials, this difference may be substantial. This may result in consumers being reluctant to buy bottles with such corks.

According to its main feature the present invention provides a closure member having a low permeability barrier extending across its length, wherein the closure member comprises two main body portions with the barrier located between them.

A convenient material for the barrier layer is a hot melt (HM) polyolefine, preferably a reactive hot melt polyurethane (RHMP). RHMPs bond very well to polymer based synthetic closures as well as to natural corks. RHMPs are flexible but relatively inelastic when set. However, we have found that when they are stretched or compressed, they become much more elastic. This elasticity allows

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the gas barrier to move with the closure. In addition, we have found that the close bonding between the layer of RHMP and the bulk material of the closure results in the elasticity of the bulk material being partially induced or transferred into the RHMP. As a result, the closure can be used in the same way as ordinary corks or synthetic closures, while the RHMP layer forms a relatively low permeability oxygen barrier.

We have also found that there is a further advantage to the use of such a barrier layer. With RHMP, the elasticity of the RHMP layer provides the force necessary to achieve the seal required; in addition, where the RHMP layer extends to the edge of the closure, it makes contact with the glass surface and acts as a gasket preventing gas ingressing and wine exiting along the closure/glass interface. Since it is a substantially denser and tougher material than that of the main synthetic material of the closure, it exerts a considerable extra force on the glass over a small area, so providing a strong seal.

The barrier can be applied anywhere along the length of the body of the closure across the long axis between its ends, so that it forms a partial or complete barrier to the movement of gases and fluids. The barrier preferably extends from one side of the closure to the other, thus providing a continuous barrier. However, it can be applied partially, for example only covering the central part and thus providing an improvement to the permeability without providing a complete barrier. It can also be used to provide total coverings. If desired, one or more further barriers may be provided at further positions along the closure.

The barrier can also extend slightly beyond the cross sectional area, providing a gasket which sits proud of the surface of the closure. Provided that the barrier is elastic enough, the small area of the gasket exerts a high point load around the circumference of the closure/glass interface. This provides a much improved seal to prevent gases passing up the interface. Most synthetics use silicone lubricants, which are not good oxygen barriers, to ensure smooth insertion

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and extraction characteristics. (In contrast, natural corks usually use paraffin wax or paraffin wax/silicone mixtures, paraffin wax being a good oxygen barrier.)

The gas barrier layer may be thick or thin. A thin layer is preferable as it takes on the elasticity of the body more effectively and does not look odd on extraction due to swelling significantly beyond the surface of the closure. However, having a thick gas barrier is more effective at inhibiting gas movement for some oxygen barrier materials. If the barrier is obtrusive, this may be reduced by suitable printing of a suitable colour and design around the sides of the cork. (Such printing is commonplace in the wine trade.)

We have a copending application "Corks and Closures", GB 02.05543.2 filed 6 March 2002, which is directed to the use of a hot melt (HM) polyolefine, either alone or in combination with a low permeability material, as a barrier in closure members. We also have a copending application "Improved Corks and Closures", filed simultaneously herewith, which is directed to the use of 2-layer barriers. Reference is made to these copending applications for details of preferred forms of barrier and materials therefor which may be used in the present closure.

The present system can be applied to natural corks as well as synthetic closures to improve their gas permeability. In the case of natural corks, the present barrier will also act as a barrier to microbiological contaminants such as cork-taint (eg trichloroanisole (TCA)) and yeasts which contaminate wine, as well as acting as a barrier to chemicals in the cork which could otherwise enter the wine such as tannins and tars.

Claims

Any feature of novelty or combination thereof within the meaning of Article 4H of the International Convention (Paris Convention).

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